

Ventilation Duct

Description

The present invention relates to a ventilation duct or tube primarily used in
5 buildings to convey hot or cold air for heating and cooling purposes respectively,
and in other circumstances where a circulation of air or fluids is required.

Conventional ducting of tubing is usually assembled prior to delivery to the
installation site so that it can be installed quickly without any further assembly.
10 However, this means that the ducting is cumbersome and bulky and so is difficult to
transport easily. This results in an increase in costs.

Ventilation ducts are known which are delivered to the installation site as individual
panels which are then assembled prior to installation. However, assembly is time
15 consuming and often requires welding equipment or the ducting includes other
components to enable the panels to be connected together. Again, the need for
additional components increases manufacturing costs.

It is an object of the present invention to overcome or substantially alleviate the
20 disadvantages with conventional ducting and provide a ventilation duct that has the
desirable aspects of being easily manufactured, stored, transported and erected for
installation.

According to the invention, there is provided a seamless ventilation duct including
25 integrally formed hinge means to enable the duct to be collapsed for transportation
and/or storage.

In a preferred embodiment, the duct comprises a plurality of elongate panels, each
panel being joined to an adjacent panel by the integrally formed hinge means to
30 enable relative movement between said panels.

Preferably, the hinge means comprises an elongate channel in the duct between each panel so that the duct folds in the region of the channel to enable relative movement between the panels.

- 5 Each panel is preferably disposed substantially at right angles to two adjacent panels when the duct is erected.

In a preferred embodiment, each panel is rigid or semi-rigid and forms one side-wall of the duct.

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When the duct is collapsed, each side-wall conveniently lies substantially in contact with another side-wall.

- 15 The side-walls preferably define a parallelogram in cross-section. However, it is envisaged that their may be more than four side-walls in which case the side-walls together define a multi-sided profile in cross-section.

- 20 The duct is advantageously made from plastics material such as polypropylene or PVC. However, it may also be made from any thermoplastic or thermoplastic elastomer with appropriate physical properties to produce an effective hinge mechanism. The duct is preferably extruded. However, it is envisaged that other methods of manufacture such as injection moulding or blow moulding could be employed.

- 25 The present invention also provides a method of manufacturing a seamless extruded ventilation duct including integrally formed hinge means comprising the steps of extruding or moulding the duct, allowing the duct to cool and folding the duct about the hinge means to collapse it for transportation or storage.

- 30 The duct may be extruded or moulded in an erect or partially erect condition. However, it may alternatively be extruded in a flat condition and subsequently erected for installation.

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An embodiment of the invention will now be described, by way of example only, and with reference to the accompanying drawings, in which:

FIGURE 1 illustrates an end view or cross-sectional view of a ventilation duct shown in a fully erect state, according to the invention;

5 FIGURE 2 illustrates an enlarged partial view of part of the ventilation duct shown in Figure 1;

FIGURE 3 illustrates an end view or cross-sectional view of the ventilation duct shown in Figure 1, but in a fully collapsed state, and

10 FIGURE 4 illustrates an enlarged partial view of part of the ventilation duct shown in Figure 3.

Referring now to the drawings, there is shown in Figure 1 an end view or cross-sectional view of a rectangular ventilation duct or tube 1 according to the invention comprising parallel first and second major walls 2,3 spaced from each other by first and second minor walls 4,5, the walls 2,3,4,5 together forming an hollow elongate duct space 7. The duct 1 is seamless and is integrally formed by extrusion in one tubular piece. The longitudinal edge of each wall is connected to an adjacent wall by hinge means 6 formed from elongate channels cut into the duct 1. As can be seen more clearly from Figure 2, each channel 6 comprises a region in the duct 1 having a reduced wall thickness which makes the duct more flexible in that region. The flat planar surfaces of the walls 2,3,4,5 themselves have a greater thickness and so are rigid or semi-rigid so do not flex so readily. Although the illustrated embodiment shows a duct 1 having a generally rectangular cross-section, it may also be square in cross-section in which case each wall 2,3,4,5 has the same width.

25 The duct 1 formed by the walls 2,3,4,5 and the hinge means 6 is extruded as a tube in one-piece and, preferably, in the form in which it is shown in Figure 1 namely, in its fully erect state and in which the major walls 2,3 and minor walls 4,5 are at right angles to each other. However, it could also be extruded in a partially collapsed state.

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Referring to Figure 3, the duct 1 is illustrated in a completely collapsed or folded-flat condition in which the major wall 2 and minor wall 4 overlap major wall 3 and

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minor wall 5. Collapse of the duct 1 is achieved by applying a shear force to the duct in the direction of arrow "X" or "Y" in Figure 1 sufficient to cause the duct to fold or crease about the hinges 6. The duct 1 shown in Figure 3 has been collapsed by applying a force in the direction of arrow "Y".

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Figure 4 illustrates an enlarged view of the region of the hinge 6 between major wall 2 and minor wall 4 and between minor wall 4 and major wall 3. As can be seen, the angle between these two walls 3,4 has been reduced substantially to zero so that the faces of these walls 3,4 now lie in contact. The channel forming the hinge 6 now
10 assumes a generally hemispherical opening when the duct 1 is in the folded state.

As can be seen most clearly in Figure 2, the channel has a bottom wall 8 and two side walls 9. The bottom wall 8 may define an arcuate surface and the side walls may extend from the bottom wall 8 at an angle of 90 degrees or some other angle. A
15 smooth radius may connect the bottom wall 8 to each side wall 9 and each side wall 9 to the face of the wall in which the channel is formed.

It will be appreciated that when the duct 1 has been extruded, it can be folded from its erect state shown in Figure 1 into its folded state shown in Figure 3 due to the
20 flexibility of the duct 1 in the region of the channels to substantially reduce its size and substantially simplify storage and transportation.

It will be appreciated that the duct 1 will usually only need to be folded flat once i.e. immediately following manufacture and erected once for installation. Once
25 installation is complete, there is generally no requirement to ever fold the duct again. Therefore, the material of the duct 1 and in particular the thin-walled section of the duct 1 in the region of the channel only needs to be capable of being flexed two, or possibly a few times, without breaking in order for the duct 1 to be collapsed and erected for installation. Preferably, the material will maintain a degree
30 of stiffness despite being flexed so that the duct 1 can be released in its erect state without collapsing under its own weight.

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In a preferred embodiment, the duct 1 is made from plastics material which can be extruded easily. Preferred materials are polypropylene or PVC or any other thermoplastic or thermoplastic elastomer with appropriate physical properties to produce an effective hinge mechanism.

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Although in one embodiment, the hinge means 6 and the walls 2,3,4,5 are all extruded from the same material, it is also envisaged that the hinge means 6 could be formed from a dissimilar material to the walls 2,3,4,5. For the avoidance of doubt, the walls 2,3,4,5 and the hinge means 6 are still extruded together and so the
10 duct remains seamless even when the hinge means 6 are formed from a different material. This can be achieved using a dual hardness extrusion process.

It can be seen that the present invention provides a ventilation duct that can be manufactured, collapsed and erected easily. As the duct is entirely formed from one
15 component or piece, there are no additional components and no tools required to assemble it. Therefore, the duct is cheaper to make and easier to assemble.
Furthermore, as the duct is seamless, it is not necessary to join two ends or walls together when the duct is erected. This is an important aspect of the duct of the invention as no joining technique such as welding or riveting needs to be employed
20 either after manufacture or at installation site.

This description relates to a preferred embodiment only and all modifications falling within the scope of the appended claims are also considered to form part of the invention.